

WHAT IS CLAIMED IS:

1. A semiconductor device, comprising:

a substrate having an insulating surface; and

an active region disposed over the substrate and comprising  
5 crystalline silicon,

wherein the active region is formed by a process in which a semiconductor film comprising amorphous silicon is provided with a promoting material for promoting crystallization thereof and is crystallized by heat treatment and irradiation of laser or an intense  
10 light, wherein said promoting material comprises one or more elements selected from the group 14 elements.

2. A semiconductor device, comprising:

a substrate having an insulating surface; and

an active region disposed over the substrate and comprising  
15 crystalline silicon,

wherein the active region is formed by a process comprising the steps of:

providing a selected portion of a semiconductor film comprising amorphous silicon with a promoting material for promoting  
20 crystallization thereof;

crystallizing the semiconductor film by heat treatment wherein the crystallization occurs from said selected portion and grows through its peripheral portion; and

irradiating the crystallized semiconductor film laser or an  
25 intense light, wherein said promoting material comprises one or more elements selected from the group 14 elements.

3. A semiconductor device according to claim 1 or 2, wherein the promoting material is germanium.

4. A semiconductor device according to claim 1 or 2, wherein the semiconductor device is one selected from the group consisting of a thin film transistor, a diode, and a photo sensor.

Sub  
P1  
5  
6. A method of manufacturing a semiconductor device, comprising the steps of:

forming a semiconductor film comprising amorphous silicon;

crystallizing the semiconductor film by a heat treatment while a promoting material for facilitating crystallization is retained on or under the semiconductor film;

promoting crystallinity of the crystallized semiconductor film by irradiation of laser or intense light,

wherein the promoting material comprises one or more elements selected from the group consisting of group 14 elements.

Sub  
D2  
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7. A method of manufacturing a semiconductor device according to claim 5, wherein said promoting material is germanium.

Sub  
C2  
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8. A method of manufacturing a semiconductor device, comprising the steps of:

applying a solution, in which a simple substance of a catalytic element for facilitating crystallization of amorphous silicon film or a compound containing the catalytic element is dissolved or dispersed, on a semiconductor film comprising amorphous silicon;

crystallizing the amorphous silicon film by carrying out a heat treatment; and

promoting crystallinity by irradiation of laser light or intense light, wherein a kind of or plural kinds of elements selected from elements in group 14 are used as the catalytic element.

Sub D4  
8. A method of manufacturing a semiconductor device according to claim 7, wherein germanium is used as the catalytic element.

9. A method of manufacturing a semiconductor device according to claim 8, wherein the compound containing the catalytic element is at least one selected from the group consisting of germanium bromide, germanium chloride, germanium iodide, germanium oxide, germanium sulphide, germane, germane acetate, tris (2,4-pentanedionate) germanium perchlorate, tetramethylgermane, tetraethylgermane, tetraphenylgermane, and hexaethyl germanium.

10. A semiconductor device according to claim 1 or 2 wherein said semiconductor device is a portable telephone.

11. A semiconductor device according to claim 1 or 2 wherein said device is a vide cameral.

12. A semiconductor device according to claim 1 or 2 wherein said device is a mobile computer.

13. A semiconductor device according to claim 1 or 2 wherein said device is a head mount display.

14. A semiconductor device according to claim 1 or 2 wherein said device is a rear projector.

15. A semiconductor device according to claim 1 or 2 wherein said device is a front projector.